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**Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals**

**Sub-Committee of Experts on the Transport of Dangerous Goods**

**Fifty-third session**
Geneva, 25 June-4 July 2018
Item 10 (e) of the provisional agenda
**Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: Joint work with the GHS Sub-Committee**

**Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals**

**Thirty-fifth session**
Geneva, 4-6 July 2018
Item 2 of the provisional agenda
**Joint work with the Sub-Committee of Experts on the Transport of Dangerous Goods (TDG Sub-Committee)**

# Aerosols – Consequential amendments from proposals in ST/SG/AC.10/C.3/2018/5 - ST/SG/AC.10/C.4/2018/3 and ST/SG/AC.10/C.4/2018/9

## Submitted by the European Aerosol Federation (FEA)*

1. As follow-up to the thirty-fourth session of the Sub-Committee, the European Chemical Industry Council (CEFIC) and the European Industrial Gases Associated (EIGA) submitted document ST/SG/AC.10/C.3/2018/5 - ST/SG/AC.10/C.4/2018/3 - "Proposal to classify chemicals under pressure within Chapter 2.3 of the GHS". This document proposes that aerosols and chemicals under pressure be combined and addressed in the same chapter (2.3) of the GHS, which currently addresses aerosols only. The document announces that amendments to the existing text on aerosols will be the subject of a separate proposal.

2. As follow-up to the thirty-fourth session of the Sub-Committee, Canada, jointly with the European Aerosol Federation (FEA), submitted document ST/SG/AC.10/C.4/2018/9 "Proposed amendments to chapter 2.3 to convert decision logics into text language". The proposed amendments to chapter 2.3 present the criteria for aerosols in text language.

3. This working document present the consequential amendments to the GHS, related to aerosols, if both above proposals are adopted.

4. The Sub-Committees are invited to consider and agree on these amendments.

* In accordance with the programme of work of the Sub-Committee for 2017–2018 approved by the Committee at its eighth session (see ST/SG/AC.10/C.3/100, para. 98, and ST/SG/AC.10/44, para. 14).

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# Annex

## Proposed consequential amendments to the GHS

1. Amend new section 2.3.1 in Chapter 2.3 as follows (Additions are underlined, deletions are in strikethrough):

"**2.3.1 Aerosols**

**2.3.1.1 Definition**

*Aerosols, this means aerosol dispensers*, are any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.

**2.3.1.2 Classification criteria**

2.3.1.2.1 Aerosols are classified in one of the three categories of this hazard class, according to Table 2.3.1, depending on:

- their flammable properties, and
- their heat of combustion,
- if applicable, test results from the ignition distance test, the enclosed space ignition test and the aerosol foam flammability test, performed in accordance with sub-sections 31.4, 31.5 and 31.6 of the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*.

They should be considered for classification in Category 1 or 2 if they contain more than 1% components (by mass) which are classified as flammable according to the GHS criteria, i.e.:

- Flammable gases (see Chapter 2.2);
- Flammable liquids (see Chapter 2.6);
- Flammable solids (see Chapter 2.7);

or if their heat of combustion is at least 20 kJ/g.

**Table 2.3.1: Criteria for aerosols**

| Category | Criteria |
|---|---|
| 1 | Any aerosol that contains at least 85% flammable components (by mass) and has a heat of combustion of at least 30 kJ/g; or<br>Any aerosol that dispenses a spray that, in the ignition distance test, has an ignition distance of at least 75 cm; or<br>Any aerosol that dispenses a foam that, in the foam flammability test, has<br>(a) a flame height of at least 20 cm and a flame |

| Category | Criteria |
|---|---|
| | duration of at least 2 s, or<br>(b) a flame height of at least 4 cm and a flame duration of at least 7 s |
| 2 | Any aerosol that dispenses a spray that does not meet the criteria for Category 1 in the ignition distance test which has<br>(a) a heat of combustion of at least 20 kJ/g, or<br>(b) a heat of combustion of less than 20 kJ/g along with an ignition distance of at least 15 cm, or<br>(c) a heat of combustion of less than 20 kJ/g and an ignition distance of less than 15 cm along with either, in the enclosed space ignition test,<br>(i) a time equivalent of 300 s/m$^3$ or less, or<br>(ii) a deflagration density of 300 g/m$^3$ or less; or<br>Any aerosol that dispenses a foam that does not meet the criteria for Category 1 in the foam test which has a flame height of at least 4 cm and a flame duration of at least 2 s. |
| | Any aerosol that contains 1% or less flammable components (by mass) and that has a heat of combustion below 20 kJ/g; or<br>Any aerosol that contains more than 1% (by mass) flammable components or which has a heat of combustion of at least 20 kJ/g but which does not meet the criteria for Categories 1 and 2 in the ignition distance test, the enclosed space ignition test or the aerosol foam flammability test as applicable. |

***NOTE 1:*** *Flammable components do not cover pyrophoric, self-heating or water-reactive substances and mixtures because such components are never used as aerosol contents.*

***NOTE 2:*** *Aerosols do not fall additionally within the scope of chapters 2.2 (flammable gases), 2.3.2 (chemicals under pressure), 2.5 (gases under pressure), 2.6 (flammable liquids) and 2.7 (flammable solids). Depending on their contents, aerosols may however fall within the scope of other hazard classes, including their labelling elements.*

~~2.3.2.2 An aerosol is classified in one of the three categories for this Class on the basis of its components, of its chemical heat of combustion and, if applicable, of the results of the foam test (for foam aerosols) and of the ignition distance test and enclosed space test (for spray aerosols). See decision logic in 2.3.4.1. Aerosols which do not meet the criteria for inclusion in Category 1 or Category 2 (extremely flammable or flammable aerosols) should be classified in Category 3 (non-flammable aerosols).~~

***NOTE 3:*** *Aerosols containing more than 1% flammable components or with a heat of combustion of at least 20 kJ/g, which are not submitted to the flammability classification procedures in this chapter should be classified as aerosols, Category 1.*

**2.3.1.3 Hazard communication**

General and specific considerations concerning labelling requirements are provided in *Hazard communication: Labelling* (Chapter 1.4). Annex 1 contains summary tables about classification and labelling. Annex 3 contains examples of precautionary statements and pictograms which can be used where allowed by the competent authority.

**Table 2.3.~~4~~2: Label elements for aerosols**

| | Category 1 | Category 2 | Category 3 |
|---|---|---|---|
| **Symbol** | Flame | Flame | *No symbol* |
| **Signal word** | Danger | Warning | Warning |
| **Hazard statement** | Extremely flammable aerosol<br>Pressurized container: May burst if heated | Flammable aerosol<br>Pressurized container: May burst if heated | Pressurized container: May burst if heated |

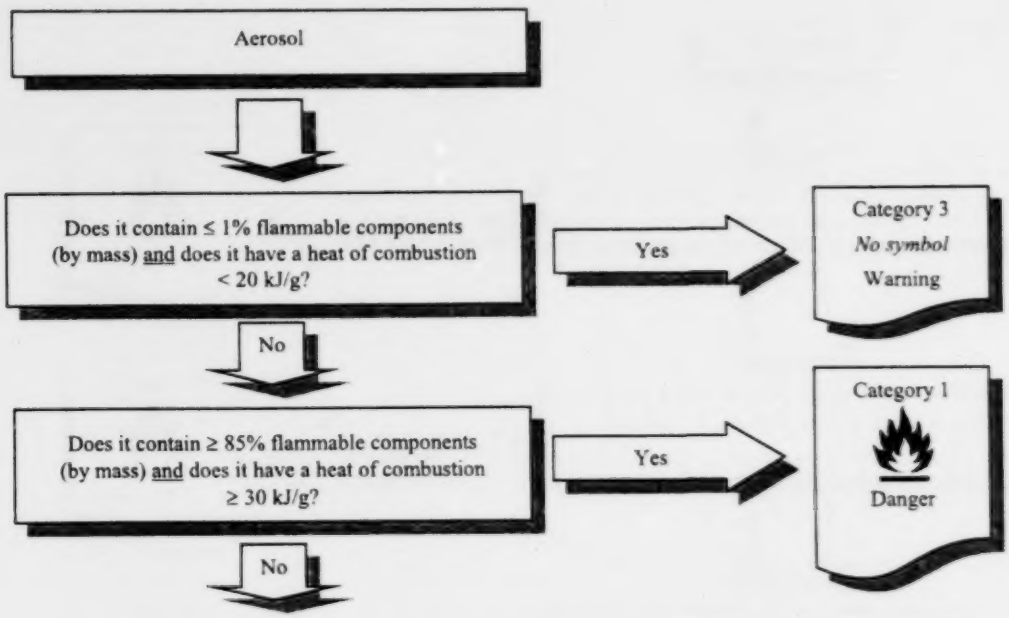
### 2.3.1.4 Decision logic ~~and guidance~~

The decision logic ~~and guidance~~, which follows, ~~are not part of the harmonized classification system, but have~~ has been provided here as additional guidance. It is strongly recommended that the person responsible for classification studies the criteria before and during use of the decision logic.

#### 2.3.1.4.1 *Decision logic*

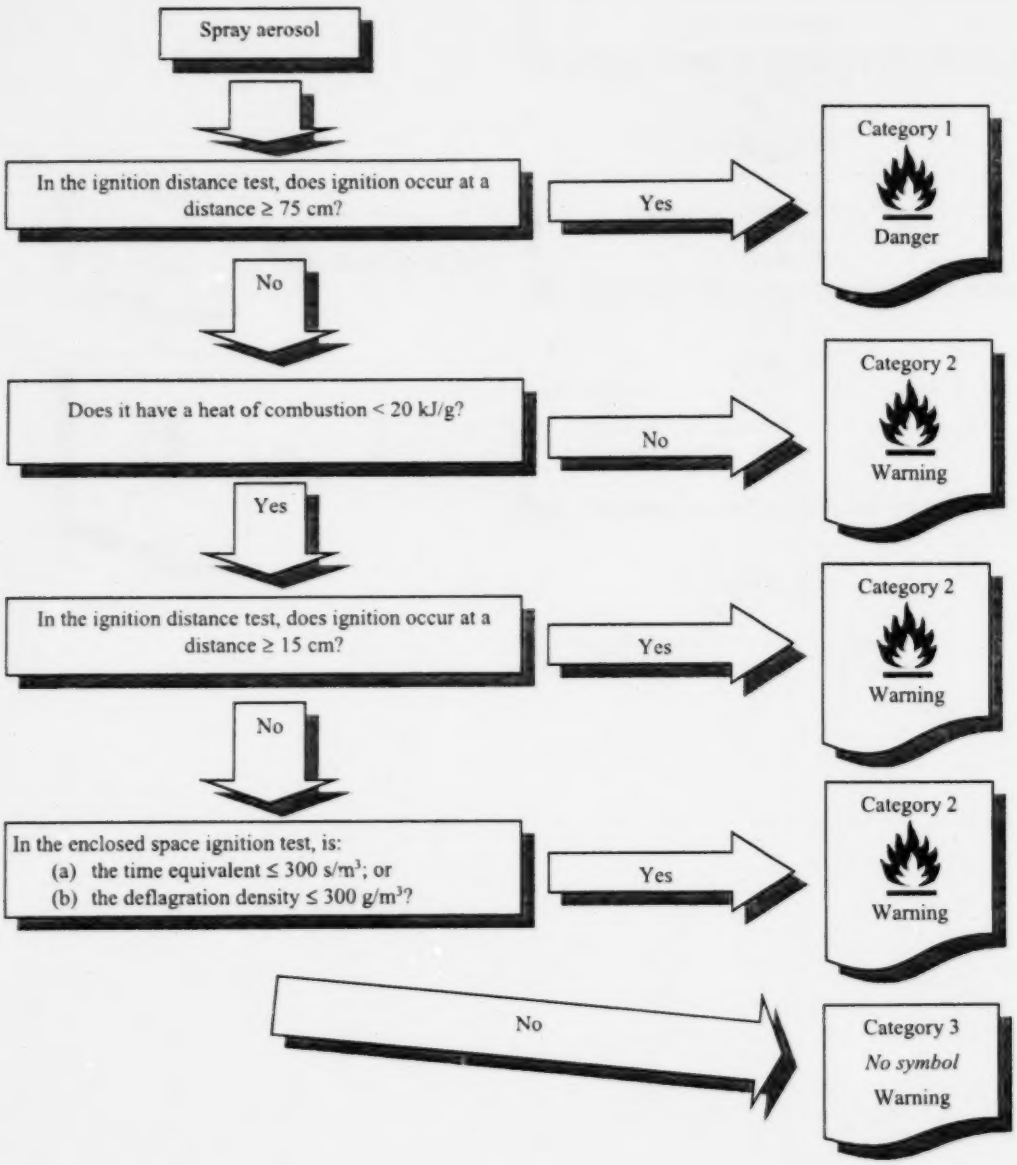
To classify an aerosol data on its flammable components, on its chemical heat of combustion and, if applicable, the results ~~of the foam test (for foam aerosols) and~~ of the ignition distance test and enclosed space test (for spray aerosols) and of the foam test (for foam aerosols) are required. Classification should be made according to decision logics 2.3.1 (a) to 2.3.1 (c).

***Decision logic 2.3.1 (a) for aerosols***

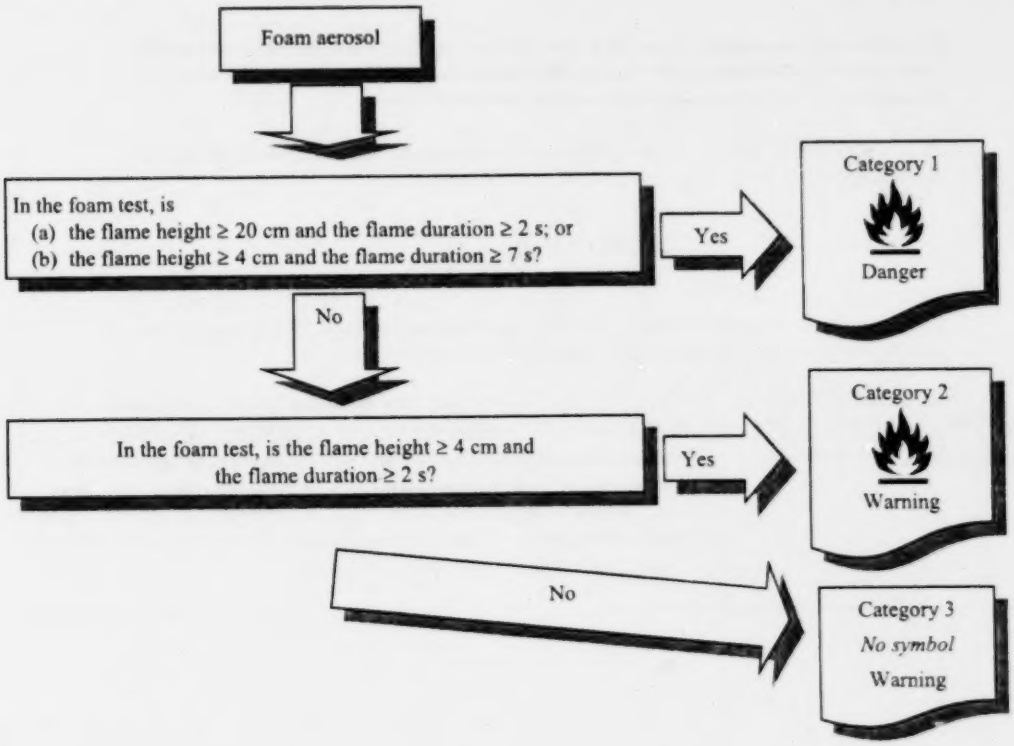

Aerosol
Does it contain ≤ 1% flammable components (by mass) and does it have a heat of combustion < 20 kJ/g?
Yes
Category 3
No symbol
Warning
No
Does it contain ≥ 85% flammable components (by mass) and does it have a heat of combustion ≥ 30 kJ/g?
Yes
Category 1
Danger
No

For spray aerosols, go to decision logic 2.3.1 (b);
For foam aerosols, go to decision logic 2.3.1 (c);

***Decision logic 2.3.1 (b) for spray aerosols***



***Decision logic 2.3.1 (c) for foam aerosols***


Foam aerosol
In the foam test, is
(a) the flame height ≥ 20 cm and the flame duration ≥ 2 s; or
(b) the flame height ≥ 4 cm and the flame duration ≥ 7 s?
Yes
Category 1
Danger
No
In the foam test, is the flame height ≥ 4 cm and the flame duration ≥ 2 s?
Yes
Category 2
Warning
No
Category 3
No symbol
Warning

~~**2.3.4.2 *Guidance***~~

~~2.3.4.2.1 The chemical heat of combustion (Δhc), in kilojoules per gram (kJ/g) is the product of the theoretical heat of combustion ($\Delta h_{comb}$) and the combustion efficiency, usually less than 1.0 (a typical efficiency is 0.95 or 95%).~~

~~For a composite formulation, the chemical heat of combustion is the summation of the weighted heats of combustion for the individual components, as follows:~~

$$\Delta hc(product) = \sum_{i}^{n} [w_i\% \times \Delta hc_i]$$

~~where:~~

~~$\Delta hc$ = chemical heat of combustion (kJ/g);~~
~~$w_i\%$ = mass fraction of component i in the product;~~
~~$\Delta hc_i$ = specific heat of combustion (kJ/g) of component i in the product;~~

~~The chemical heat of combustion can be found in the literature, calculated or determined by tests (see ASTM D 240, ISO/FDIS 13943:1999 (E/F) 86.1 to 86.3 and NFPA 30B).~~

~~2.3.4.2.2 See sub-sections 31.4, 31.5 and 31.6 of the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*, for Ignition distance test, Enclosed space ignition test, and Aerosol foam flammability test.~~

2. In Annex 3, Section 3, amend the *Matrix of precautionary statements by hazard class/category applicable to aerosols under A3.3.5* as follows:

**"AEROSOLS**
**(Chapter 2.3, section 2.3.1)"**

3. In Annex 4, amend the entry applicable to aerosols in Table A4.3.9.2 (*Data relevant with regard to physical hazard classes (supplemental)*) as follows:

| Chapter | Hazard Class | Property/Safety characteristic/ Test result and Remarks/Guidance |
|---|---|---|
| 2.3; section 2.3.1 | Aerosols | – indicate the total percentage (by mass) of flammable components unless the Aerosol is classified as Aerosol cat.1 because it contains more than 1% flammable components or has a heat of combustion of at least 20 kJ/g and is not submitted to the flammability classification procedures (see the Note 3 in Chapter 2.3, paragraph 2.3.1.2.~~1~~1) |